AGRICULTURAL ENGINEERING

THE JOURNAL OF THE

AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS

Published at the headquarters of the Society, St. Joseph, Michigan

Issued monthly. Subscription price to non-members of the Society, $3.00 a year, 30 cents a copy; to members of the Society, $2.00 a year, 20 cents a copy. Postage to Canada, 50 cents additional; to foreign countries, $1.00 additional. Entered as second-class matter, June 25, 1921, at the post office at St. Joseph, Mich., under the Act of Aug. 24, 1921. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized August 11, 1921.

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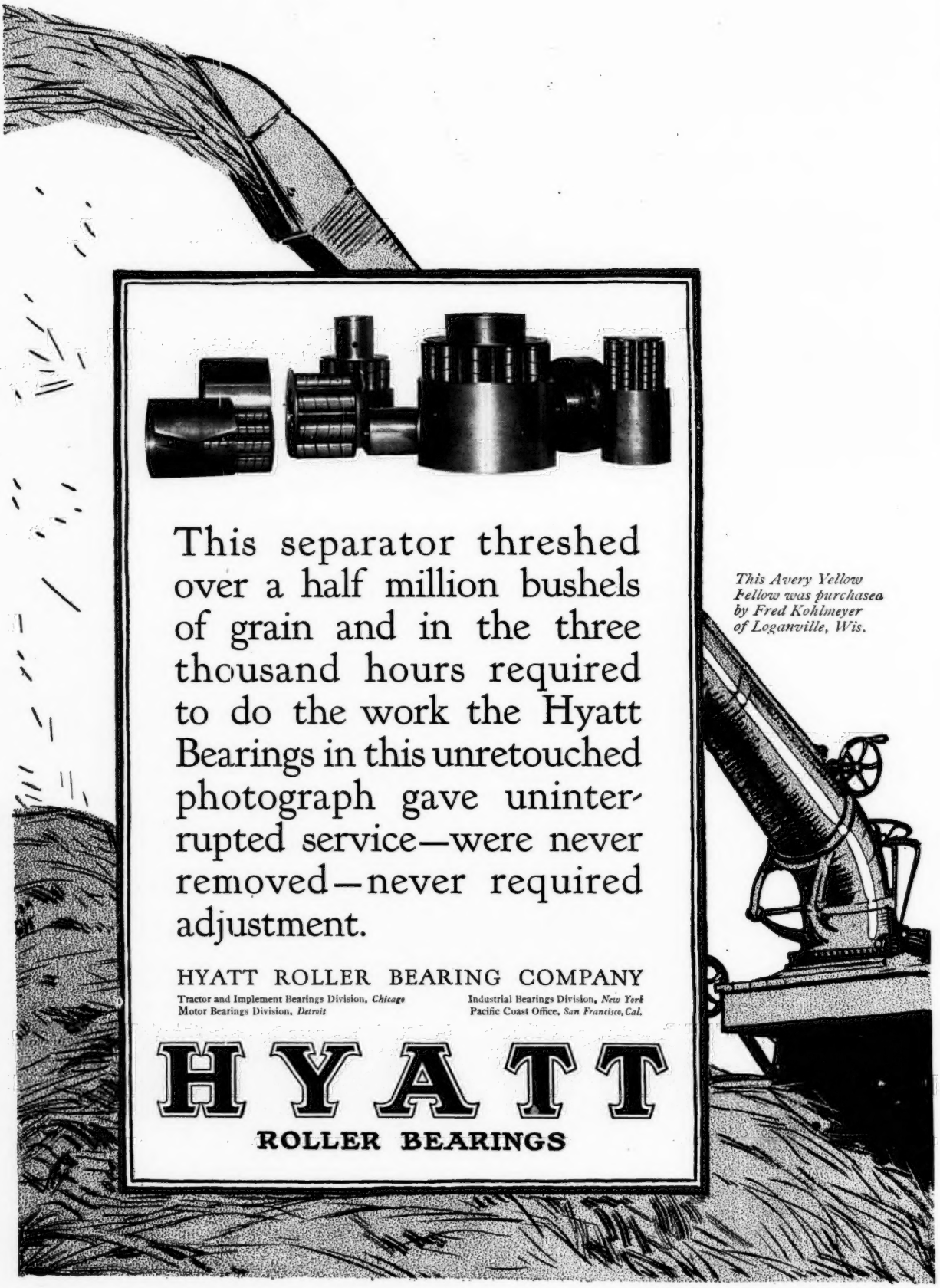

This separator threshed over a half million bushels of grain and in the three thousand hours required to do the work the Hyatt Bearings in this unretouched photograph gave uninterrupted service—were never removed—never required adjustment.

This Avery Yellow Fellow was purchased by Fred Kohlmeyer of Loganville, Wis.

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Volume 3 MARCH, 1922 Number 3

Keeping the Water Supply Pure*

By E. W. Lehmann

IN MAKING a study of the water supply for the farm home a letter was addressed to the various state health departments, to the state agricultural experiment stations and extension departments, and to the engineering experiment stations of the state colleges requesting the latest information available on the subject. The response to this letter was very gratifying; a great many circulars, bulletins, and plans were received, which were helpful in preparing the material for this report. Every publication emphasized the crying need of a better protected farm water supply and the dangers of an insanitary supply.

It is commonly known by members of the state health departments, agricultural engineers, and others interested in farm sanitation that the purity of farm water supplies are generally questionable. The lack of definite data is evident in many of the state reports. There is a definite need for more investigations along this line, especially with reference to kind of supplies used in different sections. There is also need of a closer cooperation of the agencies interested in this problem. In some of the states the college representatives apparently do not know what the health departments are doing and some of the health departments do not know what the colleges are doing, and in some colleges the individual departments interested have not gotten together. The sanitary engineering, agricultural engineering, bacteriology and state water survey departments should cooperate in every way possible toward the solution of this problem.

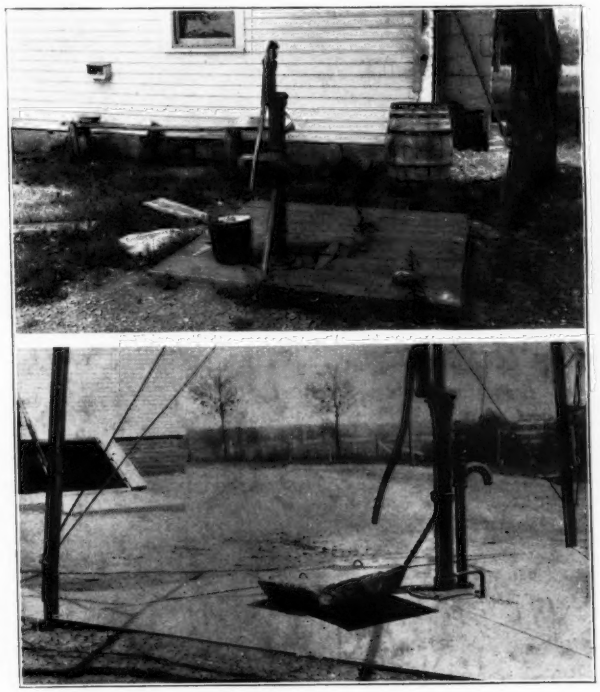
In every state where water surveys have been made the results have been practically the same. Surface supplies and shallow wells are nearly always contaminated. The same is true of cisterns. Deep drilled wells, that is, wells that pass through an impervious layer of material, are nearly always good. The greatest danger is from the surface or shallow underground supply, the shallow well, and the cistern.

The U. S. Department of Agriculture report on experiment station work in 1913, in Farmers' Bulletin No. 549, states that "of seventy-nine carefully selected typical farm water supplies in Minnesota, mainly wells, twenty were good and fifty-nine were polluted, mainly because of careless or ignorant management, and generally as a result of poor location or lack of protection against surface wash or infiltration. The rivers, surface reservoirs, and cisterns investigated were found to be polluted to an extent that it is considered doubtful whether satisfactory supplies can be secured for household use from such sources." F. T. Shutt of Canada Experimental Farms concludes from an examination of several thousand samples of water used on farm homesteads that "probably not more than one-third of them are pure and wholesome."

H. E. Barnard and J. H. Brewster of the Indiana Board of Health found in an examination of the rural water supplies in that state that "of private rural water supplies examined 177 were deep wells, 411 shallow wells, 5 ponds, 40 springs, and 27 cisterns. One hundred and sixteen of the deep wells were of good quality, 45 were bad and 16 doubtful. Only 159 of the 411 shallow well waters were potable, 309 unequivocally bad, and 43 were of doubtful quality."

The same bulletin reports that E. Bartow of the Illinois State Water Survey found that three-fourths of the shallow wells of the state were contaminated. Later surveys have shown about the same results.

In a survey made by the writer in 1913-14 in Iowa, sixty-three farm water supplies were investigated, thirteen of them were shallow open wells and fifty were drilled wells, more than 100 feet deep. The results of the analysis showed that all of the shallow wells were polluted and only one of the deep wells; the latter was a clear case of carelessness on the part of the owner. Impurities were allowed to gain entrance into the water supply through the vent hole in the pump standard.



Above: Typical wood cover with wide cracks allowing surface contamination to be washed into the well. Below: A deep well with good protection against polution either from the top or by seepage

*A part of the report of the Subcommittee on Farm Sanitation presented at the fifteenth annual meeting of the American Society of Agricultural Engineers, Chicago, December 27, 28, and 29, 1921.

In a survey carried on by the writer in Missouri fifty supplies were analyzed, forty-eight of these were from cisterns and two from shallow wells. The two shallow wells and forty of the cisterns showed contamination. In each case a standard sanitary chemical and bacterial analysis were made to determine the potability of the water.

Not only are many of the farm water supplies dangerously bad, but also many of the supplies for rural schools are not what they should be. The report of an investigation of the twenty-nine rural schools of Ramsey County, Minnesota, by the Minnesota State Health Department show that sanitary conditions are not satisfactory. "Surface drainage on 82 per cent were imperfect, water supplies on 92 per cent were unsafe, and the disposal of human excreta unsatisfactory in every case."

My own observations would lead me to make the statement that insanitary conditions and the poor water supplies at many rural schools are not only disgraceful but appalling. At many country schools in our southern states no privy is provided, and often the water for drinking is secured from a spring that is liable to contamination by human excreta.

While more data would be of value to emphasize the gravity of this problem, with the data at hand it should be recognized that shallow wells and cisterns are very often contaminated. A special bulletin of the California State Board of Health contains this statement: "Very often all that one may wish to know about the safeness of a supply may be learned by a common sense consideration, by any intelligent person, of the things that he may learn by looking about and perhaps by a few inquiries. The question that should be kept uppermost in mind is this: Does any opportunity exist for human intestinal or urinary discharge to gain access to the water?"

A prominent sanitary engineer states that it is his opinion that "90 per cent of all contamination of shallow wells and cisterns can be located within four feet of the top." It is evident that if the supply is carefully located and protected the possibility of contamination would be reduced to a minimum.

The first step in the solution of the problem of securing pure water supplies on the farm is to provide the right sort of conditions surrounding the supply. This is a matter of education. The neglect of private drinking water supplies, the lack of appreciation of the value of pure water, and the importance of keeping it pure is common throughout the country, in both small towns and on the farms.

The great majority of farmers pay little attention to the purity of the water supply. If it is of sufficient quantity and the water appears clean and it is reasonably free from odors it is considered all right.

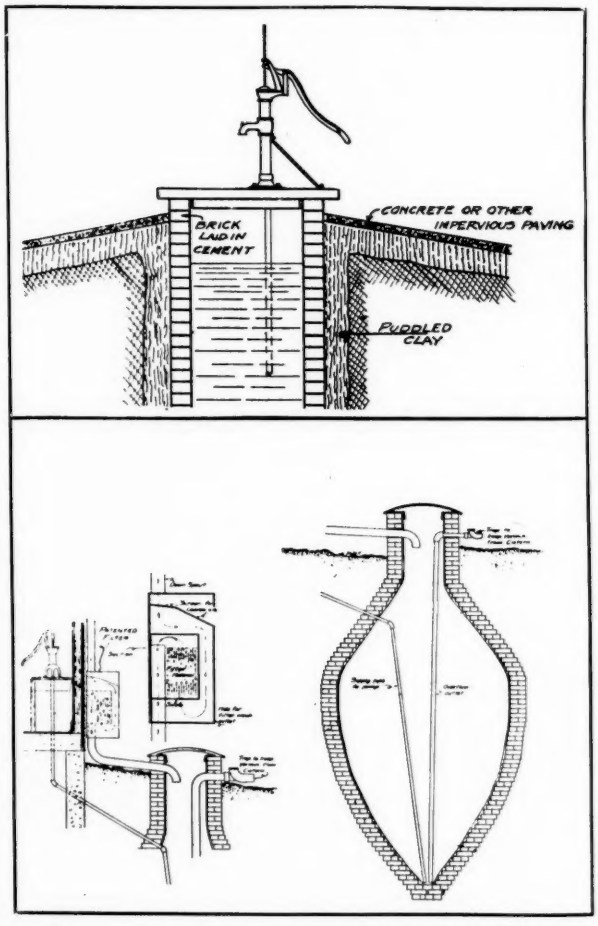
It should be thoroughly understood by everyone that water to be really satisfactory for domestic use it must meet certain physical, chemical, and bacterial requirements. From a physical standpoint the water should not contain any substance that would produce an unusual color, bad odors, or disagreeable tastes. It should be free from suspended matter. From a chemical standpoint drinking water should not contain an excess of salts or of organic matter which might indicate the presence of contamination. From a bacterial standpoint a water is not safe for drinking unless it is free from germs that cause disease. These disease germs are carried in the human discharges, the most common of which are typhoid and dysentery. It can be readily appreciated that the proper disposal of human wastes play an important part in the matter of a pure water supply.

Too many wells are located with the idea of convenience to stock and a saving in first cost, without considering the matter of location in its relation to the safety of the supply. The writer has seen shallow wells located in draws through which the entire drainage from yards and barn lots passed. There is little question as to the quality of such supplies. Examples of good and bad locations are shown by the illustrations.

After a pure supply of water is provided the only way to keep it pure is by careful protection. This is true whether the supply is a deep well, shallow well, cistern, or spring. Illustrations of methods recommended for protecting water supplies against contamination were collected from various bulletins. Many of the suggested methods of protection can be improved on, which is a job for agricultural engineers.

The problem should be studied further so that definite plans can be worked out that members of the Society will be willing to recommend. At this time the following principles will apply in protecting cisterns, wells of different kinds, and, for the most part, springs. The deep drilled well must not be neglected:

1. The curb should extend above the surface of the ground at least one foot.
2. The walls of the curb should be constructed so that no water can pass into the well without percolating through at least eight to twelve feet of soil.
3. A layer of clay should be tamped around the curb, extending to the surface of the ground at the top.
4. The top should be made of impervious material.
5. The top should be designed so there is no possible chance of the water going back into the supply once it is pumped out. Extend the top over opening rather than setting it in the opening like so many covers.



Above: Use of concrete, cement mortar and puddled clay for exclusion of surface contamination
Below: Dr. C. F. Bennett's cistern and filter design

6. Use only tongued and grooved lumber and build of double thickness when the top is made of wood.

7. Provide a raised place for setting the pump.

8. Provide a distinct slope away from the supply at the top. This applies equally to cisterns, wells, and springs.

9. Do not have "ventilators." They are of no use if supply is clean, and may be a means of impurities gaining entrance.

10. Use a good pump.

It seems to be a common idea with many agricultural engineers that cistern water is seldom if ever used for drinking, but such is not the case. In many communities the cistern is the only source of water for drinking and often it is vile beyond words. I know of cases where folks have continued to drink water from cisterns until the odor would force them to clean it out, when they would find most everything from snails to dead cats.

As was stated earlier in the report, in one Missouri community forty-eight out of fifty supplies were from cisterns. In some localities in Illinois nearly all drinking water is from cisterns, the same is true in other states.

While the principles outlined above should be kept in mind in protecting cisterns, there are additional points to consider that should not be overlooked by either the city dweller or the farmer who has a cistern. The collection of the water is all important; in fact, most of the impurities that get into the cistern supply are washed in from the roof; this includes dust, dead insects, birds, bird droppings and nests, and spores of plants. The roof should be thoroughly washed off before any water goes into the cistern. This is so often neglected that the only safe way it seems would be to install an automatic valve to control the flow. Another matter that should be remembered is the cistern overflow outlet; it should always be provided with a type of trap valve to allow the cistern to overflow but prevent the entrance of mice, rats, snakes, snails, worms, frogs and even lizards. In practically every bulletin reviewed an overflow pipe was recommended for the cistern, but no means was provided for its protection.

Dr. C. F. Bennett, of Fenton, Iowa, has some rather advanced ideas in regard to cistern construction, arrangement of suction pipe, overflow pipe, and design of filter. He not only proposes the use of a trap in the overflow pipe, but proposes that this pipe extend to the bottom of the cistern, which is to be constructed in a cone shape so that all sediment would go to this point and be carried out through the overflow pipe. He also proposes that the suction pipe extend to the low point in the cistern so that any sediment that finds entrance would be immediately pumped out, if not carried out through overflow. These are points that might well be considered in cistern design.

Dr. Bennett states in substance to secure a safe, sanitary, and potable cistern supply the following must be accomplished:

1. Screening out of the course detritus such as leaves, birds nests, etc.
2. Flushing of roofs and gutters
3. Sedimentation during process of filtration
4. Constant and automatic removal of sediment
5. Proper and regular self-cleaning of filtering material.

Another point suggested by Dr. Bennett is the screening of gutters.

The following principles on cistern construction are outlined in a recent Kansas bulletin by H. B. Walker:

1. The receptacle should be of proper size, suitably located, and absolutely water tight.
2. A proper filter must be installed to strain and clarify the water.
3. A well-arranged system of roof piping must be laid out for the collection of water.
4. An overflow or waste pipe should be provided to remove surplus inflow water.

A number of types of filters are suggested in the many bulletins and circulars studied. Among them are: The small commercial metal filter with screen and charcoal filtering material, the sewer pipe filter, the compartment filter, the concrete box filter, beehive filter, commercial pressure and gravity filters, etc.

Filters may be classified as pressure filters and gravity filters. The gravity filters may be further classified as downward flow and upward flow. Each of the different types have particular merit.

Pressure filters would no doubt be more generally used if the results obtained were more commonly known. Many water supplies in the towns as well as in the country could be greatly improved by using pressure filters. A common type of pressure filter which is quite effective in removing all impurities has as a filtering medium either unglazed porcelain or stone. These filters will not only clarify the water and remove sediment, but will remove bacteria.

While filtration is about the only practical method of making questionable or impure water fit to drink, water can be made safe by sterilization. Sterilization may be accomplished by either boiling, distillation, or by the use of chemicals. Water made sterile by boiling or distillation is flat and insipid to the taste. Distillation is impractical. Use of chemicals or making sterile by boiling, results in the water being still of poor quality because the impurities remain in it.

Purification of water by freezing is a method of which we rarely give consideration. Studies carried on by the Minnesota State Board of Health show that water is purified by this process. Samples of ice and water were taken simultaneously from the same sources in a number of different localities. The ice was clear and solid and was taken where the water was at least three feet in depth under the ice. The results of the analysis showed that the water contained 16,000 bacteria per cubic centimeter, while the same volume of ice showed only 5 bacteria. With reasonable care at harvest the ice supply should be safe.

While much is being said these days about the value of an adequate supply of water and the importance of having it piped to the point to be used, we must not overlook the fact that it is more important than all else that the water be pure and healthful.

The Ames Clover Hulling Machine

THE Iowa agricultural experiment station in its annual report states that practically every seed company of any importance in the United States and Canada, as well as in many foreign countries, is using the Ames hulling and scarifying machine—an Iowa product. This machine was perfected in the spring of 1914. Clover seed which gave a germination of less than five per cent, after being treated with this machine gave a germination of over ninety-five per cent. Seedings were made in the field with seed which was not scarified, while adjoining plots were planted with the same seed after it had been run through the Ames scarifier. The unscarified seed failed to give any stand at all, while the plots seeded with scarified seed were perfect. This machine was given to the farmers of the world with no restrictions whatever upon its manufacture and the agronomy section of the Iowa station has continued to supply, free of cost, complete information regarding its construction and operation. Hundreds of machines have been made by farmers and seed growers, as well as by seed companies. A carpenter in a small Iowa town has made and sold in the neighborhood of two hundred of these machines, with only limited advertising. This machine is probably the only successful commercial scarifier in the world. Its value has been accepted by agricultural leaders and investigators everywhere.

Advantages of a Planned Rural Development*

By **Elwood Mead**
Professor of Rural Institutions, University of California, and special lecturer for Harvard University

THE most inviting field for rural planning is in the creation of new communities. Here no obstacles arising out of the past have to be removed. No established institutions or human prejudices have to be put aside. The advantages of aid and direction in the creation of new communities will therefore be my theme, but before entering on its discussion I wish to consider briefly some of the conditions which confront rural life in both old and new communities.

American agriculture is influenced from forces long in operation but which have operated with greater vigor during the past half century. One of the results is an exodus of land born people to the cities. The farmer's son once he sets his foot in the city rarely wants to return. What is the cause of this migration? Why this dislike of life on the farm? The problem has been too suddenly presented for complete agreement as to the answer. These facts, however, seem well established.

With the disappearance of free land this nation entered on a new social and economic era. Free land had been the open road to opportunity. When it closed nothing had been provided to take its place. Organizing thought and ability had been centered so largely on cities that conditions in the country were overlooked. In the cities single shops had been grouped together into mass industries. Great combinations to control a single product girdled the earth with their warehouses and factories. Trade unions fought for better wages and better conditions of life for their workers. A new social and economic civilization was being created.

These forces left the American farmer untouched. The pioneer was solitary in habit and thought. He did not seek to create communities but to acquire land. He shifted for himself and left others to do likewise. The result has been that a well-organized rural society which offers to men and women a life as attractive as the city is rarely found. The great social and economic advantages of the organized life being created in cities passed over the heads of farmers, until he found himself confronted by forces he did not understand and oppressed by power against which he rebelled but against which he was helpless.

The loss to American agriculture from this individualistic attitude has been greater than is realized. But so long as there were farms to be given away and public resources to be seized it could not be overcome. Rising prices for land made owners ignore conditions created as city factories took from the farm more of its arts and industries.

Now there is an awakening. The farmer has come to realize the importance of business in agriculture and that his business is organized and controlled by others. Keen witted business men sell his grain and stock, make his bacon and butter, and bake his bread for him. He has to accommodate his life and business to outside forces. In politics and trade he finds the business minority controlling the farming majority. With the profits of rising land prices gone, with the need for increased returns to meet increased costs, with tenantry increasing at a disquieting rate, the farmer is awakening to the need of better business and an organized community life. The farm bureau movement owes much of its vitality to the fact that it is bringing to rural life the aid of men trained in business affairs.

*Paper presented at the fifteenth annual meeting of the American Society of Agricultural Engineers, Chicago, December 27, 28, 29, 1921.

The creation of new communities according to carefully thought out plans is a new idea in American life. In this we are behind the rest of the world. In Denmark, Germany, and Australia, for instance, the ablest minds have studied how to create organized rural communities as Americans have developed manufacturing industries. Ownership of land by its cultivator has been a basic idea. The money or the credit necessary to do this is provided before settlement begins. The settler is required to have a definite capital and a credit system, under which he is loaned the remainder, is a part of every scheme.

Realizing that conditions must be created that will enable the farm buyer to earn the money to pay his debt out of the soil, these governments give all the aid which science can extend in relation to soil, climate, and crops and in the design and erection of farm buildings. The result has been one of the greatest agrarian advances in all history.

The Land Settlement Act of California passed in 1917 was an innovation. Nothing resembling this had ever before been attempted in the United States. This nation had sold and given away public lands but there had been no selection of settlers. Nothing had ever been done to render it certain that the public domain would go to those who needed it or would permanently live on it. There had been no classification of soils or adjustment of prices to agree with the differences in soil and locality. The subdivision of land has been mechanical. Nothing has been done to hold people in one place or create an affection for a particular locality or piece of land.

The Land Settlement Act of California sought to change all these methods. A nonpolitical board made up of able business men was given authority to buy areas large enough to create organized communities. It was to subdivide any area bought into small farms, fix the conditions on which these farms were to be sold, and determine the capital which the settler must have. It could select the settlers and was given unrestricted authority to reject any settler not regarded as qualified to succeed.

The basic ideas of this settlement plan were as follows:

1. That there should be no attempt at settling people on single isolated farms. Only tracts of land large enough to create an organized community and this meant that it must be large enough to have at least 100 farms. Less would not afford the economic advantages of cooperation and social life and the overhead expenses of administration would be too burdensome.
2. That the settlers should own their farms. An effort should be made to postpone if not prevent tenantry. Ownership of the land by its cultivator is required for not less than 10 years.
3. That a credit scheme should be provided under which the settler having the capital required could be loaned money to complete his development.
4. That expert guidance both in development and in the subsequent farming operations should be provided.
5. That cooperation should be encouraged.
6. That the kind of agriculture or horticulture of any community should be based not only on soil and climate, but on the opportunities for a market and on securing a return for the settler's industry at the earliest possible date.
7. That the community spirit should be encouraged so that

loyalty and civic pride in the locality would be strengthened and opportunities for wholesome recreation and fun be provided.

Two settlements have been created. One at Durham in the Sacramento Valley, the other at Delhi in the San Joaquin Valley. In both cases the settler pays 5 per cent cash and is given 36½ years' time to complete the payments. The payments are amortized. The annual interest rate is 5 per cent and the principal 1 per cent, so that by paying 6 per cent a year the settler becomes the owner of the property in 36½ years. The board can loan the settler up to $3,000 as an aid in development. If this money is used to make permanent improvements like houses, 20 years' time is given in which to repay the loan. If it is used to buy livestock, then the money must be paid within five years' time. Loans may reach 60 per cent of the cost of improvements.

The first question in a new community is health. The experts from the University said Durham was menaced with malaria, but that this could be prevented by the creation of a mosquito abatement district. A health district which took in not only the settlement but a large surrounding area was created.

In order that the price of each farm would agree with its value a soil map was made and was the basis of the subdivision of the land and the price of farms varied from $48 to $250 an acre. This seems like an extreme range but when these farms were applied for, every one was the first choice of some applicant. One hundred and twenty-five families bought farms in the Durham Settlement. If this had been an unplanned development, every settler would have had to do everything needed to change raw land into productive farms. Those 125 families came from half a dozen states. If they had been left alone, they would have competed with each other for the services of the local blacksmith, carpenter, and mason to build their houses and make their improvements. They would have paid more for material than it was worth because they were compelled to purchase at a disadvantage to buy quickly. Some settlers would have built shacks, and others houses too costly for their means. This situation had been foreseen. Long before the land was thrown open to settlement the board had employed a farmstead engineer who had planned the layouts of farms, secured prices of building material, made arrangements to buy at wholesale and secured discounts that no individual settler could have obtained. When the farmers and their wives came on the ground, they found suggestions for homes. They had their designs of houses suited to the climate and to be built of material that could be used most effectively. As a result the settlers' homes while not expensive, show taste, comfort, and beauty, and are the admiration of all who behold them. Yet this result has been brought about at an expense of anywhere from 10 to 25 per cent below what would have been possible in an unplanned development.

Those who planned the community believed that dairying should be the most important single industry. Before any settler arrived on the ground, letters had been written to fifteen of the leading agricultural colleges of the country asking if the adoption of a single dairy breed of cows would be an advantage, and if so, what breed was recommended. All answers agreed there were marked advantages in having a single breed.

Under an unplanned development, each of the 125 families would have had to buy cows in the local market and each would have competed against the other. Instead, a committee of three who knew good stock bought cows for the settlers all over the State of California.

The money value of combination and cooperation was most strikingly shown when these settlers had to find a market for milk. Selling as individuals they would have been at the mercy of dealers, but selling as a community with the central skimming plant, a chilling apparatus and testing not only for butterfat content, but for bacteria. They were then in a position to offer an article of superior quality and in an amount large enough to attract distant buyers. The result is that Durham milk is sold to a single purchaser at a price fixed by the seller and not by the buyer. The sign "WE USE DURHAM MILK" is to be found in restaurants one hundred miles up and down the Sacramento Valley.

Intelligent dependable farm laborers are as necessary as farm owners. The American farm laborer has almost disappeared because he is at a disadvantage both as to the hours of labor, the wages received, the opportunity for the education of his children and their social or lack of social status in the community when compared with the city laborer.

So far as is known, the California state settlements are the first to create farm laborers homes. Twenty-eight of these homes were included in the plans of the Durham Settlement. With each there were two acres of land. Those who acquired these properties bought them on the same conditions as the farmers bought theirs. The state loaned money to help build the houses. The buyers paid only 5 per cent of the cost of the land and were given 36½ years in which to complete their payments.

There was considerable misgiving regarding the results of what was regarded as a socialistic experiment, though why the helping a farm laborer to secure a home should be regarded as more socialistic than helping a farmer become the owner of the land he cultivates is difficult to understand.

Today no one questions the success of this innovation. Each farm laborer has met his payments to the state. These homes are the most attractive feature of both the Durham and Delhi settlements. The children of these laborers live in homes that are as convenient, comfortable and satisfactory as the homes of the children of farmers. There has been no trouble about employment. The income from the two acres of land has constantly increased until in some cases, it now affords a comfortable living. The families of these laborers are leading lives of independence, comfort and self-respect. The children of these farm laborers will be the farm owners of the future.

Under unplanned development, it takes about 25 per cent of the cost of the farm to find the settler. In other words, one-fourth of his money goes to pay for his capture. Under the planned development of California, not one dollar has been spent in commissions to selling agents or in advertising these farms. The broader opportunity has been sufficient attraction. About 8,000 letters asking about farms were received by the Land Settlement Board between January and October this year. Land owners are coming to realize that it is far better to have their land sold under the conditions of this Act than under the haphazard methods of land salesmen. The board is offered large areas of good land without the payment of a dollar. Owners are willing for them to handle it and to accept payments as made by settlers.

That a land settlement policy of this character should be a feature of every reclamation scheme is now generally recognized. It is destined to have wider field of usefulness. There are sections in the Middle West where 70 per cent of the land is now cultivated by tenants. This condition of affairs cannot continue. If it does, a land problem as serious as that formerly in Ireland or Denmark will soon confront this country. Nothing but planned development with a credit system, with expert advice will serve to reconstruct and rehabilitate some of these tenant farmed areas. The conditions are similar to those which made planned development the policy of Denmark and Germany. The work of the rural colonizer should go hand in hand with the work of the reclamation engineer. One creates the conditions which makes settlement possible and the other pays the cost.

Report on Disk Harrow Investigation*

THE problem of this investigation is to determine whether the cutaway disk has any real merit or enough real merit to justify the manufacturers in continuing its manufacture. They felt it would be a step backwards. During the war the War Industries Board eliminated the cutaway disk as a manufactured product from all except one manufacturer who had that as its main line. Our investigation took two general forms; first, questionnaires to obtain information, and, second, field tests to determine if possible definite results. In the first place we had to find out where the cutaway disks had been used. It was no use to send out a general questionnaire, because the man that had never used a cutaway disk—and he is in the large majority—certainly could not give any definite opinion. In order to do this we first sent questionnaires to prominent manufacturers who were listed in the directories as manufacturers of cutaway disks. We received very excellent reports from them. Thirteen manufacturers replied; only one of them is making cutaway disks or has made cutaway disks since the elimination by the War Industries Board.

Together with this we asked them for their own opinion regarding cutaway disks. The advantages given are: (1) The cutaway penetrates the ground easier, (2) is more effective in stony soil, (3) does more effective work in hard baked land, (4) lighter draft (which is one that hasn't been borne out by field tests), and (5) cuts sods to better advantage. Of course, manufacturers don't all agree in these.

The disadvantages of the cutaway type are: (1) it does very uneven and ragged work, (2) it doesn't pulverize the ground as thoroughly as do round blades, (3) it is not as satisfactory for general work as the round blade, (4) it is much more difficult to sharpen, (5) short lived, (6) has a larger percentage of breakages, and (7) more expensive to manufacture. Of course with a manufacturer there is a big problem in the distribution and duplication of these implements.

Taking the localities which were given as still demanding the cutaway, a series of questionnaries were sent out to dealers, county agents and farmers.

TESTS REVERSE IDEAS ON DRAFT

From the central states we didn't get very many replies, which indicates that it is not a very vital question. A few of them are thoroughly sold on the cutaway, and some of the replies we get indicate that the cutaway penetrates deeper in hard ground, cuts stalks better, is harder to sharpen than the full blade, but doesn't need sharpening at all. That is one thing that is brought out very forcibly by the men that use the cutaway; they state it is considerably more troublesome to sharpen it, but some farmers use them three or four years and never have sharpened them. They can still go out and scratch the ground with a dull cutaway where with a round blade equally dull they couldn't make tracks. One dealer thoroughly sold on the cutaway said that in the last year he had had the blades on his disks made cutaway to meet the demands of the trade. The reports coming in favoring the round blade are much in the majority. First, they find the cutaway disks are easily broken, and short-lived. Only one-half of the disk penetrates, and they find a lot of trouble with repairs. Eastern Oregon is the place where most of this opposition has come from. I have the following statement from Mr. Brandt: "If the cutaway disks should be discontinued the average Eastern Oregon farmer would feel that he had to go out of business. The average farmer in Western Oregon cares very little one way or the other."

Their problem in that country, where they use a header, is that a large amount of straw is left on the ground which must be worked into the soil, and taking implements as they come, I have an idea the cutaway disk under the average conditions would show some advantage the first time over.

The field tests were made at both the California and Iowa agricultural experiment stations. At California one disk was used for a comparative test, with both sets of blades. The blades were changed for each test. At the Iowa station two identical disks were used, with the exception of the blades. Draft tests were made in both places. In all the tests the full blade gave a lighter draft than the cutaway blade. There was no case that came under my observation where the reverse was true. The cutaway pulled heavier. From the results of the Iowa station tests it averaged about 15 per cent heavier, the weight on the disk being the same, in some cases running up as high as 20 per cent. I had always heard the statement before that the cutaway disk pulled lighter; that is what I was expecting to find, but we found the reverse to be true. As would be expected, the cutaway blades penetrated more deeply than the full blade. This deep penetration of course is intermittent. However, this is of no particular advantage in hard ground, as under these conditions the cutaway blade will be broken.

I ran some tests on very hard ground, and in traveling about 20 rods we broke five leaves off the cutaway blade, so that advantage of penetration doesn't mean anything on hard ground.

GOES THROUGH TRASH WITHOUT CUTTING

The observations made would indicate that the ability to penetrate is of most advantage in cutting through coarse materials on the surface of the ground, such as corn stalks, heavy stubble, or heavy application of manure that is not well rotted. I think the first application over, the cutaway will make a better showing in some of those conditions, but with regard to cornstalks, I find that while the cutaway cuts through and gets at the ground, there is quite a tendency for the corn stalks to be pushed along until it gets to a notch and then the disk rolls over it. I couldn't agree with the claim that it cuts corn stalks better, because I think that in a heavy growth of corn stalks the disks will run over the stalks, and you can get hold of some dirt wherever the dull round blades are and you cannot even trace it. It would seem that the ability to penetrate might better be obtained by loading the disk than by using the cutaway blade.

Regarding durability, at both stations considerable breakage of cutaway blades was encountered when used on hard ground, and no breakage with the full blade. Mr. Hoffman of California made some tests on the testing machine with the two types of blades, putting them in the testing machine and breaking them down. I don't have a report of that test, but it is very favorable of course to the round disk. The design of a cutaway blade is essentially weak. The round blade owes its strength to being dished like a wagon wheel, so it is very strong.

*Presented at the fifteenth annual meeting of the American Society of Agricultural Engineers, Chicago, December 27, 28, and 29, 1921.

In all the tests we had no trouble with breakage of the round blade. The cutaway blade seems to scour a little more readily, but to offset this it is difficult to apply a scraper satisfactorily on account of the notches, and the scrapers are likely to jam where the points of the blade are broken off. That is, you get into hard ground and break a blade off and the scraper is apt to go through there and lock the disk. We have had that happen quite often. At the Iowa station on the hard ground we attempted to make a comparison of the ground that was loosened by each type. We had a place where we had done some grading. The ground was very hard. It never had been plowed and was quite smooth. We drove through with one disk and then with the other and marked off equal layers in each one and gathered up the loose dirt to see which one loosened the most dirt. We couldn't find any consistent advantage for either one, either on single disking or double disking.

That is all that we have to report, and, briefly, I would say that the disadvantages of the cutaway disk far outweigh its advantages.

COMMITTEE ON DISK HARROW INVESTIGATION

E. V. Collins, Chairman — A. E. Brandt
C. I. Gunness — E. J. Stirniman

DISCUSSION

MR. CUNNINGHAM: To what do you attribute the increase of draft on the cutaway disk?

MR. COLLINS: You see it when you clear off the ground. With a cutaway you dig down in a little pocket, and you have to loosen that all the way around. With a round blade it is a continuous process. That is, it is easier to dig a ditch than it is to remove the same amount of dirt by digging a series of post holes.

PRES. WHITE: I sometimes wonder if the members of this society realize the importance of this investigation. Now this is a matter over which the manufacturers are very seriously concerned, and it is no small compliment to this society that they turned it over to us with the injunction "Find the Facts." We selected the best committee that we thought we could find, and we believe we got them, but in this matter there is a responsibility that rests upon every member of this society, and especially the college men, to see that we get the facts in this case. I am sure we will be glad to receive suggestions or criticisms of the work that has been done to date, and suggestions for other lines of investigations that may be profitably taken up.

There is one phase of this investigation that Mr. Collins hasn't reported on at all yet. The committee hasn't gotten into what it costs the manufacturers to carry two types of disks in their lines, duplicate equipment and all that. It not only adds to the cost of the cutaway harrow, but adds to the cost of the full blade harrow. There are many ramifications to this problem. It is not only an engineering problem, or to state it in a better way, it is an engineering problem in the biggest sense, which not only takes into account technical investigation, but also the attitude of the man who is manufacturing the disk, who is selling it, who is using it, and the entire economics of the situation. An investigation like that is one big job, isn't that right, Prof. Collins? Prof. Collins is doing the work, he knows better than the rest of us.

MR. JOHNSON: I think the committee have overlooked one essential point in the investigation of this question of cutaway disks, and that is that it is largely a sectional one, and from the report of Mr. Collins and from the standpoint of the manufacturer, the investigations have been made in territories where there is not a real, live demand for cutaway disks. The cutaway disk was developed in the East by a concern that made a four gang harrow, and when the manufacturers began developing tandem attachments for the original two gang harrow they equipped them pretty generally with cutaway disks, and in the distribution and introduction of tandem attachments for disk harrows I think any manufacturer will bear out this statement that the West, the country west of the Mississippi, gradually but almost universally began to ask for tandem attachments with regular straight blades and that the demand today continues in the East, on account of the difference of soil conditions, and also in the South.

Now what the manufacturers would like to know, it seems to me, is whether in those sections, East and South, the demand for a cutaway disk has some basis of efficiency under those conditions, or whether it is just a notion of the farmers. I would suggest that the committee in continuing this investigation in the territories where the cutaway disks are quite commonly called for, secure this information.

MR. DICKERSON: There is one point which has come to me in connection with this investigation which might well be followed up. That is, in some of the brushed over land of Wisconsin there seems to be a demand for the cutaway disk for the first cultivation of this brushed over land, before it is plowed. I wonder if the committee has run into that.

MR. COLLINS: I haven't gone into that at all.

PROF. WIRT: There are hundreds of farmers and dealers in the East, that swear by the cutaway disk harrow, and I feel that the committee should do a lot of investigational work there and have several institutions conduct these tests, that is, in Pennsylvania, Maryland, Virginia and the Southeast.

I appreciate the fact that it takes considerable time to make a real test on the farm machines, but on a subject of this importance I believe that a great many institutions should cooperate and test out these harrows fully before we say that one or the other is the one to use.

PROF. GUNNESS: In Massachusetts I was rather surprised at the results. Of course, the cutaway is made close to us, and I think the older harrows are largely cutaway, but of late the tendency has been toward the full disk. The county agents invariably reported they can see no necessity for obtaining the two types, even in our state, where we have the stony land. They recognized some of these points that are universally known, that the cutaway has the advantage in certain sections, but in spite of that they felt that the advantage of standardization would be enough to warrant the discontinuing of it, although that wasn't just what we were supposed to investigate.

MR. CRAMPTON: There is one point that Mr. Collins makes I would like to go a little further into. That is the question of corn stalks. Now is it a fact that the section where the corn stalks are prevalent, that is, where they have been used on corn stalks, is where they are discontinuing the use of the cutaway? His report, generally speaking, in this section anyhow showed they were discarding the cutaway harrow. In that case it seems they must have been convinced that the round disk was better for corn stalks than the cutaway. And the further fact, that it seems as though the insistent demand was still from sections where corn stalks were not used very much, such as he mentioned in a certain small district in Washington and another gentleman mentioned a few limited districts in the Southeast.

MR. COLLINS: I think that is very true. I am glad you brought that out. While the cutaway will go through the corn stalks and get at the dirt, it doesn't cut the corn stalks and that is what we want to do. The corn stalk is big enough so it will slide along the edge of the blade until it gets to the notch and then it rides through on the notch.

The Engineer in Public Service*

By **Herbert Hoover**

Secretary of Commerce. First President of the Federated American Engineering Societies

THE American Engineering Council of the Federated American Engineering Societies has entered upon a path of public service that is unique in the whole United States. The engineer has devoted himself all these years to the upbuilding of the material values of the United States. He has done that effectively—more effectively than has been accomplished in any other of the great countries of the world.

The birth of this organization marks the evolution of the engineer into an interest in public affairs. With his intelligence, his experience and training and the unique knowledge he possesses not only of the material but the intangible value amongst our people, he is now organized so that his united voice may become heard outside of his profession.

We have probably 175,000 engineers in our country, representing an intellectual possibility for service possessed by no other group. It is therefore an augury of real social development when the engineers of the United States join together for purposes of public service.

This organization has the unique value among the associations that it cannot have any material interest for its purpose. No engineer can receive any material benefit from it. It can advance no economic interest. It cannot therefore be charged with any ulterior motive. It is accepted by the whole American people who have become acquainted with its objectives as being clearly single-minded.

During the last year we considered a number of the problems that confront the American people in the light of what services the engineers could perform in their solution. We resolved early in the progress of the Council to undertake an investigation into the elimination of waste—a problem with which the engineer alone was fitted to deal, a problem that had not come in for solution outside of engineering circles.

As a result of the investigation carried on during the past year and of the report made there has been an enormous expansion of the consideration of these fundamental questions—questions that enter into the whole problem of the standard of living of our people. At the time we undertook that investigation we were still at the height of a boom. The country was going on recklessly spending, with extravagance and over-expansion. Almost every engineer, in consideration of the economic situation of the time and the early meetings of the Council, wondered when it would all come to an end and appreciated the waste that came from the operation of the business cycle, which reaches its peak in booms like that then affecting the country. That investigation resulted in a final report in the midst of the depression that was inevitable. It came just at a time when the country was receptive for ideas that in the long run must mean the correction of these tremendous losses from overexpansion and from depression.

On taking this position that I now hold (Secretary of Commerce) I had felt that it was the duty of the Government, if it was possible, to carry into effect some of the purposes outlined by the Council. We have in the Department of Commerce, accordingly, established a number of agencies intended to effect the results outlined as possible. And in getting further knowledge and experience with this problem I am indeed impressed with the fact that it is the most fundamental of all of the economic problems with which the American people must deal. It becomes doubly important now because we are faced with certain primary conditions that cannot, in my view, receive any solution except along the lines laid down in that report on the elimination of waste.

If we take the year 1913 as a base year for economic calculation and assume that the price of goods to the producer was 100 and likewise the cost to the consumer was 100, and if we then examine the situation today we will find that in many, in fact the majority of cases, the value of commodities is not far from 100 in their return to the producer and, more particularly, we will find the agricultural products often far below that level. But, on the other hand, to the consumer the price level is, in the majority of cases, from 150 to 170.

We have, therefore, a tremendous distortion. That distortion bears heavily on the producer and the consumer. One or the other of the two must carry the brunt of that load. And if we are to decrease that margin, it can only be through the elimination of waste.

We have to bear in mind that during these last seven years we have probably added eight billions per annum to national, state, and municipal taxation.

If, on the basis of the present value of the dollar, we estimate that the national productivity of the country is somewhere near fifty billions, it is possible to calculate at once that taxation alone accounts for at least twenty units out of the sixty or seventy with which we have to deal.

There are other elements that have entered into the problem—increased cost of transportation and a thousand direct or indirect increases in the cost of manufacture or distribution.

And, clearly, unless we can bring the cost of commodities to the consumer more nearly into line with the return to the producer, we shall indeed, to go no further, reduce our agricultural population to the status of the European peasant.

That is a problem of manufacture, transportation, and distribution. The distortion is not due to undue profits at the present time. It is distortion that can be corrected only through the elimination of wastes in our processes of distribution and other phases—transportation, business methods, manufacture, and so on. Indeed the question of the elimination of waste entered into two years ago because of those glaring, outstanding instances that challenged every engineer now looms in the mind of every economist as the real hope of reestablishing economic balance in the United States.

We have enlarged our vision as to what constitutes waste. We are suffering today from one of the most fearful wastes that can come to us in that we have from two to three millions of idle men. Lost labor once over the dam is lost for all time. An inquiry into the causes of our vast unemployment brings us at once to consideration not alone of the world as a whole and of our own economic cycle in relation to it but also to the problem of how to avoid such periods of waste.

Now the engineers have rightly pointed out that there are times when we make large increases both in the direction of plant and equipment and production of consumable commodities; that if we are to correct and alleviate the intensity of our business cycles, we must find some method by which we can expand our plants and equipment at periods when the demand for consumable goods has relaxed. Nor is that a

*Address at the banquet given during the first annual meeting of the American Engineering Council, the executive body of the Federated American Engineering Societies, Washington, January 5, 1922.

misconception. For if we were to hold over a part of our seasonal operations on great public utilities and public works through periods of from seven to ten years, a reserve of probably no more than ten per cent stored up for periods of depression in the production of consumable goods would enable us to maintain an even tenor and to secure even production of all commodities.

There lies one of the greatest wastes and it is in the anticipation of that waste that lies one of the great economic problems of the country.

There are many ramifications of the waste problem which you are familiar with—more familiar than I am. But there is one factor in the saving of waste that I believe the engineers might give further consideration to and perhaps more investigation. And that is the problem of a larger view in electrification.

We are all aware of the results obtained in the investigation of the superpower development of the Atlantic seaboard. Superpower is not impossible in many other sections of the country. We are indeed on the threshold of enlarging the distances of transmission. We have the possibility of reducing waste through a large phase of electrical development made during the past thirty years. The American people have no appreciation of the possible results and the added efficiency, productivity, safety and advance that could be obtained in the enlargement of our entire electrical equipment. And there is no body that could give this problem such consideration and so illuminate it in the national sense as this Council could do. It indeed requires the services of every branch of engineers that compose the Council. With the possibility ahead of us of the development of some twelve to fifteen millions of horsepower, the consolidation of hundreds, even thousands of minor plants, the enormous savings to be made through the substitution of electrical power for steam—in that there is a probability of the greatest material saving of waste possible in any country in front of the American people.

Now it is one thing to suggest a problem and another thing to suggest its solution. It is a far more difficult thing to state a problem in a fashion that people will understand and state its solution in a fashion that will carry conviction. But an association of this kind, ramifying as it does into the best intelligence of every single community of the United States, has the opportunity to develop popular conception of its ideas more effectively than any other group in the country.

Still, I am not attempting to outline to you the services that you can undertake, for you have on your docket a long list of matters which must be given study and advancement. Thus I understand that you have had before you some question in the matter of a publication.

That subject was up when I participated in your deliberations. We recognize the necessity of cohesion among the engineers. The objectives of the Council can be phrased in the common language of the great visions of engineers in the direction of the services they can perform for their communities. And in the contact of engineers with the public life of the nation there is no possibility of overlapping in the technical services of our member societies.

I realize that the financing of such a publication as some of our members contemplate is of extreme difficulty. Yet, when we entered upon the publication of the report on elimination of waste, we faced an expenditure of some forty or fifty thousand dollars, and found that there were enough men ready to aid in carrying the investigation through. I do not therefore assume that the necessary expenditure in this case is insuperable but I do believe that one of the strongest measures that can be taken by the Council in promoting the unity of its own membership and the cohesion that it will create is some form of a service journal. And it is not alone a problem for your directors that the engineers should be reported in the public councils of the Nation, but it is a problem of inspiring the same attitude of mind among the engineers in every city, town, and village in the United States. There is no state or city or municipal government that does not need the advice of the American Engineering Council. There is no problem either in federal or state or municipal legislation that does not at some point touch upon material construction and therefore come within the purview of the engineer. So that while the Council here in Washington and in those centers where the directors can keep in contact with needs and the problems in hand do a great service, the same opportunity and the same need exist throughout the country.

I know of no way of inspiring service except by contact. That service the country needs. It needs the plans and the intelligence of its engineers—the men who have in the very nature of their work the inspiration and enthusiasm and yet are the greatest realists in the world—and they are the men who should be heard from. For the service you have done during the past year is small measure of what can and will be accomplished by you, through the Council.

The Control of Soil Erosion*

By **Virgil Overholt**

Mem. A.S.A.E. Extension Agricultural Engineer,
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EIGHTY thousand acres of Ohio land have been practically ruined by soil erosion. It is estimated that the Scioto River each year carries away enough Ohio soil to build a pyramid 250 feet high covering a 10-acre field. Soil erosion occurs in every county of the state and constitutes a serious problem in at least forty counties.

Excessive speed is responsible for the greater part of the damage done by motor vehicles. Surface water running over the soil at uncontrolled speed is likewise the cause of immense loss to the people of Ohio. Soil erosion is due largely to the too rapid movement of surface water. Hence, important preventive measures will consist in the proper control of the surface runoff. Surface water must be carried down the hill at a velocity not great enough to cause erosion. Methods of control include underdrainage, the growing of noncultivated crops, the use of earth dams, brush and straw, sod strips and terraces.

In the South a type of control has been developed which is known as the "Mangum" or "broad base" terrace. There are other types of terraces, but owing to the fact that they interfere with farming operations, the Mangum is the only one in common use. Mangum terraces consist of broad ridges of earth following the contour of the land at vertical intervals of from 3 to 8 feet, and having a grade not exceeding 6 inches per 100 feet. A field terraced in this manner presents the appearance of a series of gentle waves. Mangum terraces cannot be used where the slope of the land exceeds 15 feet per hundred.

*Reprinted from "Timely Soil Topics," issued by the department of soils of the Ohio State University.

Men are accustomed to doing most things by beginning at the bottom and working up. But in terracing, the highest one is laid out first. This should be completed before starting the next one below it. If a lower terrace is put in first, a heavy rain may bring down more water than an individual terrace is designed to handle, thus washing it out. An outlet must be provided for a system of terraces. This may be into a natural ravine, a roadside ditch, or a hillside ditch along a fence line.

An ordinary 16-inch walking plow and a V-shaped grader or ditcher are the best tools for terracing. The terrace is marked out by plowing a furrow along a line of stakes previously set. Three or four more furrows are plowed, all dirt being thrown towards the center. This is followed by alternate rounds with the grader and plow until the terrace is from 15 to 20 feet wide and 18 inches higher in the center than at the flow line. A weak point is likely to develop wherever a terrace crosses a gully. At such places the terrace should be built higher and wider than at other points. The completed terrace should not be cultivated until it has been allowed to settle for one season. It is good practice to sow a cover crop on the terrace the first year.

J. A. Adams, a prominent Missouri farmer, has devised an earth dam which is especially successful in controlling large gullies. The dam is located where the banks are high and the ditch narrow, or just below the point where two gullies come together. A sewer-pipe culvert of the size indicated in the table below is laid in the bottom of the gully at the point chosen. An earth dam is built over this. The earth is taken from the sides of the ditch above the dam by the use of team and slip scraper. The banks are given a slope not exceeding 45 degrees to the horizontal, and the dam built wide enough on top to be used as a driveway. Care should be taken to build the dam higher than the gully so that during times of excessively high water, if the culvert cannot handle all of it, the surplus will flow around rather than over the dam. An inlet is made by placing an elbow in the upper end of the culvert and extending it vertically one or two feet above the bottom of the gully. As the ditch fills up, additional lengths of pipe may be added to the inlet until the desired fill has been attained. Protection is provided for the inlet by driving four heavy stakes around the sewer at the elbow. These stakes are covered with woven wire to form a screen. It is essential that the outlet of the culvert be provided with a plank or concrete spillway 8 to 10 feet long to prevent the water from undercutting the dam.

NUMBER OF ACRES DRAINED BY TILE

Removing Two Inches of Rainfall in Twenty-Four Hours

SIZE OF TILE	Fall of Tile in Feet Per Hundred							
	1.0	1.5	2.0	3.0	4.0	5.0	7.5	15.0
Inches	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
6	7	9	10	13	15	18	29	28
8	15	19	22	29	31	34	40	43
10	29	32	38	47	54	60	74	85
12	42	52	60	73	85	96	100	135
15	75	90	105	129	149	166	204	237
18	131	145	166	204	236	263	321	373

Anyone who has played around an old water-power grist mill will remember the mill race. This was a ditch dug along one side of the stream from the dam to the mill. Being constructed with very little fall, the water passed through it slowly and quietly, with no tendency to erode the sides or cut the ditch deeper. Today this type of ditch is used to prevent erosion. Ohio has many hillside fields, washing badly, not because of the rainfall upon the field itself, but on account of the large runoff from woodlots and unterraced land above. This condition can often be controlled by constructing "mill race" ditches as high as possible on the land to be protected. Such an intercepting ditch should follow the contour of the hill with a grade not exceeding 6 inches in 100 feet. Too much fall is a common cause of failure. This is because the mill race ditch will ordinarily be required to carry from two to five times the volume of water handled by a common Mangum terrace. But in most Ohio soils, the ditch itself is not likely to erode where the grade does not exceed 6 inches per 100 feet and where the length of the ditch is not over 1000 feet. Such ditches can often be constructed at the foot of an uncultivated hillside, thereby preventing a large amount of surface water from spreading over the bottom land below.

A straw and brush dam properly constructed is an excellent method of filling gullies. A common mistake in the use of straw for this purpose is to fill the ditch completely at threshing time, with the result that the water breaks out on either side and a new gully is started. Another practice has been to pile brush in the bottom of a gully, cover this with straw, and pile dirt on top of the straw. Heavy rains will cause a channel to develop through the brush and in time the gully may be as bad as ever. It is not wise to attempt too much filling at a time.

The best practice is to place posts in a crescent-shaped row, curved down stream across the gully. The tops of the posts should be inclined down stream so as to offer less obstruction to large floating objects. In form the dam is lower in the center than at the sides. Its height in the center should not be equal to more than one-third the depth of the ditch. Woven wire fencing is securely stapled to the posts. Six to eight inches of straw are placed against the wire and over the bottom and sides of the ditch for a distance of from 5 to 10 feet above the dam. Fine brush is placed directly on top of the straw and coarse brush on top of this. All brush is placed with butts upstream and thoroughly tamped into place. As soon as the gully has filled to the top of the dam, other similar dams should be built between the first ones. When the desired fill has been secured, the gully should be converted into a permanent sod strip. If a filled-up gully is cultivated it is likely to wash out completely in a single season because of the loose structure of the material with which it has been filled.

Soil which underlies a tight sod will not wash. There is probably no simpler means of controlling erosion than by use of permanent sod strips in hillside valleys. Such strips not only form a protective network, but also greatly retard the velocity of the water, thereby reducing its power to cut. Such sod strips render farming operations more difficult, but it must also be remembered that bad gullies are infinitely worse in this respect. In plowing fields having sod strips, the furrows should run at right angles rather than parallel to it. A furrow parallel to a sod strip invites the formation of a new gully. The plow should be taken out a varying distance from the sod so that there will be no well-defined line where the plowed land begins and the sod leaves off.

Roofing Materials

SEVEN years ago a test of thirty-five brands of three-ply prepared roofing was begun by the agricultural-engineering section of the Iowa agricultural experiment station. In addition to chemical and physical tests of the materials, a weathering test was started. The investigation has proceeded far enough to reveal the beneficial influence of a protective layer of mica, sand, or crushed stone upon the durability of the roofing.

An investigation is now being made of the most practical ways to repair and maintain roofing of this kind.

Agricultural Engineering Development

A Review of the Activities and Recent Progress in the Field of Agricultural Engineering Investigation, Experimentation and Research

Edited by **R. W. Trullinger**
Mem. A.S.A.E. Specialist in Rural Engineering, Office of Experiment Stations, U. S. Department of Agriculture

EFFECT OF CURVATURE UPON FLOW IN OPEN CHANNELS, H. P. Eddy. [*Engineering News-Record* 87(1921) No. 13, pp. 516, 517.] An analysis of considerable data on the subject is given, indicating that the information is so fragmentary and indefinite that it is impossible to draw entirely satisfactory conclusions, but that it is apparent that in artificial channels for which the coefficient in Kutter's formula will not exceed about 0.025 for a straight channel, an addition of from 0.003 to 0.005 should be made to the coefficient for sections in which the amount of curvature is considerable. It is considered probable that the frictional loss due to curvature varies with the radius of curvature and with the velocity of flow, which should be made the basis for further study.

EFFECTS ON CONCRETE OF IMMERSION IN BOILING WATER AND OVEN DRYING, W. J. Schlick. [Iowa Engineering Experiment Station Bulletin (Ames) 59(1920), pp. 24 Figs. 13.] Studies made in the course of investigations to determine standard methods for testing drain tile are reported.

In the investigation to determine the methods for testing the resistance of drain tile to injury from repeated freezing and thawing, whole tile were subjected to a natural freezing and thawing test and pieces from tile of the same lots were subjected to an artificial test in which the specimens were frozen in a refrigerating box and thawed in boiling water. The variations between the results for concrete tile in these two tests were so great as to warrant studies to determine their cause.

This work included studies on (1) the effect of immersion in boiling water on the strength of concrete tile and on the results of the standard absorption and freezing and thawing tests; (2) the effect of oven drying at different temperatures upon strength and upon the results of the absorption tests; (3) determination of whether or not moisture of crystallization is driven off by oven drying and at what temperature and in what amounts; and (4) determination of the most practicable temperature for oven drying and length of drying period, when absorption tests are to be made of large groups of samples.

It was found that immersion in boiling water even for 15 and 30-minute periods causes a marked reduction in strength of concrete. The initial immersion had a much larger effect than any subsequent immersion. Because of these facts it is concluded that a freezing and thawing test in which the specimens are immersed in boiling water, either in the preliminary absorption test or in the thawing treatment, becomes primarily a strength test by which the effect of the boiling may be measured.

Immersion in boiling water for five hours, followed by cooling in water, increased the amount of moisture in the pores of the concrete over that when the specimen was immersed in water at room temperature for 72 hours. This increase averaged about 40 per cent for pieces from concrete drain tile, but varied with the character and quality of the concrete. Immersion in boiling water, followed by cooling in water, of concrete specimens, cured in water without previous drying, caused a small but consistent loss in weight. Since this loss in weight was accompanied by a loss in strength it is concluded that both actions are due to physical changes caused by chemical actions set up by the high temperature in the presence of moisture.

The tests also indicated that the effect of oven drying on strength is actual, but is so small as to be obscured wholly if the specimen is boiled also. It seemed, however, that the effect of drying was approximately constant at all temperatures, from 50 to 180 degrees Centigrade, and an increase in drying temperature seemed to counteract slightly the effect of subsequent boiling. The loss of weight due to drying and the per cent of absorption in either test increased and, consequently, the time of drying decreased as the drying temperature was increased.

It is concluded that immersion in boiling water causes a rapid continuation of the process of hydration or setting, and that this is accompanied by physical changes, possibly more or less temporary, that cause the change in weight and the loss in strength.

"While these studies have shown that immersion in boiling water reduces strength and increases the per cent absorption, and that taking check weights after longer drying periods gives slightly higher absorption results, there seems to be no valid reason why the more rapid 'standard' boiling absorption test should not be retained for specimens that are not to be used in subsequent tests."

TRACTORS TRIUMPH AT FARGO TESTS, H. E. Everett. [*Chilton Tractor Journal*, 7(1921), No. 2, pp. 7-17, Figs. 46.] The records of the tractor demonstration held at Fargo, North Dakota, in June, 1921, are presented. The work consisted of plowing and preparing and seeding the land.

Kerosene tractors showed respective average consumptions of kerosene of 3.01 and 1.25 gallons, of gasoline 0.12 and 0.094 gallons, and of lubricating oil 0.11 and 0.04 gallons per acre. Gasoline tractors showed respective average consumptions of gasoline of 2.77 and 1.28 gallons, and of lubricating oil 0.05 and 0.03 gallons per acre.

The kerosene tractors required 0.94 and 0.418 man hours per acre and the gasoline tractors 0.94 and 0.43 man hours per acre of work.

The respective averages of the six best records on fuel consumption were, for kerosene 2.51 and 1.01 gallons, for gasoline 0.041 and 0.034 gallons, and for lubricating oil 0.08 and 0.02 gallons per acre.

The five-horse outfits competing showed an average consumption of hay per outfit of 352 pounds, of oats 13.85 bushels, an average man labor requirement for plowing of 2.64 hours, and for preparing and seeding of 1.43 hours.

CONVEYANCE LOSSES OF WATER ON U. S. RECLAMATION SERVICE IRRIGATION PROJECTS, E. A. Moritz. [*Reclamation Record*, U. S., Washington, D. C., 12(1921), No. 4, pp. 180-182.] Data from measurements of seepage losses during seven years from U. S. Reclamation Service canals are reported in the table at the bottom of this page.

Excluding the Rio Grande and Uncompahgre projects, the lowest indicated loss from the 22 projects shows a mean of 24.3 per cent from the Tieton project, Washington. The highest loss for the period was 53.2 per cent for the Carlsbad project, New Mexico. The average loss for all the projects, exclusive of the two above mentioned extremely low losses, was 36.1 per cent. From this it is considered fair to assume that 25 per cent is about the minimum loss that may be safely estimated under favorable conditions, and that 50 per cent is sufficiently high for a well planned project under favorable conditions. The commonly accepted theory that the seepage losses from canals decrease with time is not borne out by the data presented.

Data from 277 measurements of actual and relative losses from 24 different classes of materials are also reported in the following table:

LOSSES PER DAY IN CANALS OF THE U. S. RECLAMATION SERVICE

[Depths in feet per square foot of wetted area]

Soil	Number of observations	Maximum	Minimum	Mean
Gravel and sand	2	3.62	1.44	2.53
Gravel	38	7.05	.22	1.70
Gravel and rock meal	9	2.84	.88	1.56
Sand	5	1.79	.81	1.27
Rock meal	18	1.73	.38	1.24
Sand and loose rock	7	.86	.62	.72
Sandy loam	60	3.70	.01	1.01
Loam	5	1.44	.84	1.07
Sand and volcanic ash	21	1.66	.22	.90
Gravel and volcanic ash	5	1.54	.38	.88
Volcanic ash	3	1.16	.56	.82
Brule clay	4	1.11	.72	.91
Clay and gravel	18	1.34	.16	.79
Clay and sand	12	1.43	.50	.76
Adobe	9	.93	.46	.65
Hardpan and loose rock	2	1.12	.24	.68
Clay and shale	7	1.02	.30	.59
Volcanic ash, clay, and hardpan	4	.77	.46	.60
Cemented gravel and sandy loam	2	.47	.40	.44
Caliche	2	.49	.38	.43
Clay	12	.77	.11	.34
Clay loam	12	1.12	.06	.30
Gumbo and sandy loam	11	.77	.12	.29
Concrete lining	9	1.07	.06	.33
All soils	277	1.66	.43	.87

These data show that clay, clay loam, and gumbo and sandy loam indicated an average loss as low as or less than that from concrete. The highest losses were indicated by gravel and sand. It is stated that the two most common methods of preventing seepage losses are lining with concrete and puddling with silt. Since concrete lining is very expensive it should be resorted to only after all other means have failed, especially if concrete materials are not readily available.

THE DISINTEGRATION OF CONCRETE IN ALKALI SOILS, G. M. Williams. [*Journal of the Engineering Institute of Canada*, (Montreal) 4(1921), No. 8, pp. 446-455, Figs. 8.] A brief review and summary is given of work on the subject conducted by the Montana Experiment Station, the U. S. Bureau of Standards, the Wyoming Experiment Station, the U. S. Department of Agriculture, and the U. S. Reclamation Service. The different studies have included work both in the laboratory and field, and have dealt with all qualities of concretes and mortars exposed to a wide variety of conditions.

The laboratory studies agree that disintegration is due primarily to reaction between the salts in solution and certain constituents of the cement. Disintegration is first a chemical action which may under some conditions be accelerated by crystallization of the resulting products as well as by alternate wetting and drying and the action of the elements.

The field investigations verify the results of the laboratory studies, and a study of the conditions indicates that the rate of disintegration is dependent upon the concentration of salt solutions, characteristics of the concrete, and exposure conditions. Sulphates appear to be the most injurious. Chlorids and carbonates are usually present, but their effect on the reactions has not been definitely established. Concrete of the highest quality, based upon present standards, has been seriously affected in waters containing high concentrations of sulphate salts. Concentrations of salts in soil water vary so greatly within short distances that the present knowledge of underground drainage conditions does not permit the drawing of definite conclusions as to the maximum concentrations which may be encountered in any locality.

The conclusive demonstration that concrete of the best quality may be disintegrated is taken to indicate that the first step of the investigation is complete. The second step is considered to be the finding of some means other than by drainage of preventing disintegration of concrete by alkali salts and is thought to be dependent upon chemical research. It is pointed out in this connection that a cementing material is needed having all the good properties and advantages of Portland cement with the additional quality of immunity to the action of alkali salts.

SEEPAGE LOSSES

Project	Total losses (per cent) 1912	1913	1914	1915	1916	1917	1918	Mean	Predominating soils
Salt River	40.0	40.0	42.7	40.0	43.3	43.7	45.9	42.2	Sandy loam and clay.
Yuma	34.4	32.0	27.7	20.0	27.4	25.3	23.2	27.1	Rich alluvium.
Orland	20.0	26.5	26.0	27.3	20.5	27.3	33.1	25.8	Sandy loam, silt, and gravelly loam.
Uncompahgre	4.8	5.1	7.6	12.4	2.2	2.9	7.7	6.1	Red sandy gravel, adobe, and clay loam.
Boise	45.5	33.9	34.8	37.1	34.8	35.8	35.1	36.7	Clay loam and light sandy loam.
Minidoka:									
North Side gravity	26.0	22.6	25.0	36.3	43.9	48.9	41.4	35.2	Sandy loam, clay loam, and volcanic ash.
South Side pumping	35.1	32.9	35.1	36.3	38.8	36.6	35.6	35.8	Do.
Huntley	16.2	21.6	28.6	41.3	40.3	48.9	47.5	34.9	Clay and sandy loam.
Milk River	42.8	32.7	40.8	61.4	38.5	41.4	35.3	41.8	Sandy loam, clay, and gumbo.
Sun River	20.0	38.1	39.7	41.8	41.9	37.6	40.3	37.1	Sandy loam, clay, adobe, and alluvium.
Lower Yellowstone	43.0	52.0	52.4	43.1	47.9	42.8	46.9	46.9	Sandy loam and gumbo.
North Platte	38.7	38.4	36.8	66.0	40.7	47.2	37.7	43.6	Sandy loam.
Newlands	39.8	36.7	29.9	41.2	29.9	32.2	38.0	35.4	Sandy loam, clay, and volcanic ash.
Carlsbad	48.0	54.5	55.5	48.6	58.5	57.2	50.1	53.2	Pecos sandy loam; large lime content.
Rio Grande	...	6.8	2.7	5.1	6.5	3.7	14.9	6.6	Rich alluvium.
Umatilla	27.8	27.4	40.1	43.8	36.5	24.8	32.2	33.2	Sandy loam.
Klamath	36.1	39.8	40.1	50.3	49.1	41.5	40.4	42.5	Disintegrated basalt, volcanic ash.
Belle Fourche	31.7	40.2	43.6	31.1	15.7	31.5	32.6	32.3	Clay and sandy loam.
Okanogan	47.1	38.4	21.1	24.1	22.2	20.4	33.7	29.6	Volcanic ash, sand, and gravel.
Yakima, Sunnyside	26.7	25.8	28.4	31.2	26.2	26.8	23.4	26.9	Sandy loam and volcanic ash.
Yakima, Tieton	16.6	21.4	27.2	27.4	27.3	26.2	27.8	24.8	Volcanic ash.
Shoshone	36.4	36.5	37.2	35.1	34.9	41.8	37.7	37.1	Light sandy loam and clay loam.

A. S. A. E. and Related Activities

A.S.A.E. Officers and Committee Organization for 1922

OFFICERS

President, A. J. R. Curtis
First vice-president, G. W. McCuen
Second vice-president, David Weeks
Secretary, Raymond Olney
Treasurer, F. P. Hanson

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David Weeks
J. B. Davidson
F. N. G. Kranich
E. A. White
F. A. Wirt
Geo. W. Iverson
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W. G. Kaiser
P. S. Rose

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Frank P. Hanson

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Geo. W. Iverson
Raymond Olney

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David Weeks
Daniels Scoates
W. G. Kaiser

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E. A. Stewart
R. W. Trullinger
C. E. Seitz

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L. J. Smith

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E. W. Lehmann
R. L. Patty

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C. S. Whitnah
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R. U. Blasingame

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C. S. Whitnah (suggested)
A. E. Stewart (suggested)
H. R. Straight (suggested)

Farm Building Equipment
(Not appointed.)

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O. B. Zimmerman
R. P. Messenger
C. M. Eason

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L. W. Chase, *Chairman* (Appointed but has not yet accepted)
Left Hand Plow Investigation
G. W. McCuen, *Chairman*
Wm. Aitkenhead
R. U. Blasingame
C. I. Gunness
C. E. Seitz
Tractor Field Machinery Committee
Theo. Brown, *Chairman*
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C. B. Rose
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Disk Harrow Investigation
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A. E. Brandt
A. H. Hoffman
L. J. Smith
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G. W. Gunlogson, *Chairman*
John Mainland (Threshing Machines)
A. B. Welty (Belting Committee)
H. M. Gehl (Silo Fillers)
Grain Handling Equipment Committee
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Soil Erosion Committee
Q. C. Ayers, *Chairman*
E. W. Lehmann
J. T. Copeland
C. A. Norman
A. W. Turner
H. H. Sunderlin
Colonization Committee
O. V. P. Stout, *Chairman*
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W. G. Kaiser
David Weeks
Daniels Scoates

DATA COMMITTEE

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A. S. A. E. REPRESENTATIVE ON AMERICAN ENGINEERING COUNCIL

S. H. McCrory
R. W. Trullinger (Alternate)

Reclamation Section Objective

THE objective of the Reclamation Section for 1922 has been outlined by David Weeks, chairman of the Section, as follows; every member of the Society interested in reclamation work will be interested in this outline, and incidentally it can be used to good advantage in interesting reclamation engineers in membership in this Society:

Accomplishment can only be attained by establishing a goal, therefore that the Reclamation Section of the American Society of Agricultural Engineers may exist for a purpose, it becomes necessary to determine an objective toward which all efforts may be directed.

There is a quantity of research being carried out, the results of which are very slow in being disseminated and applied in practice. Many existing reports contain long theoretical discussions regarding the analyses that have been made. Often the conclusions together with perhaps a very brief statement of the process leading to those conclusions are all that is necessary for practical application provided great care is exercised in selection.

There are many instances where research has been carried out without opportunity to compile and print the results of the investigation. Many reports of investigations are used by only a small number of persons because of a lack of knowledge concerning their existence, importance, proper application, or their reliability.

There are a number of perplexing problems that can only be solved by combining knowledge from many sources, or by combined efforts of many individuals.

In view of these facts a statement of the objective of the Reclamation Section might be summarized as follows:

1. The presentation of untried material before the members of the Section through AGRICULTURAL ENGINEERING and at the annual meeting, as well as professional meetings of the Section, for the purpose of determining its importance, proper application, and reliability.

2. The dissemination of technical information throughout the membership of the Society.

(a) By beginning the preparation of a bibliography on reclamation engineering.

(b) By presentation of technical papers before the members of the Society at the annual meeting and also other professional meetings of the Reclamation Section.

(c) By the publication of technical articles in AGRICULTURAL ENGINEERING.

(d) By the presentation of technical papers before the members of the Society at the annual meeting and other professional sessions of the Section.

3. The collection of fragmentary material through the cooperation of the several members for the purpose of combining into a completed whole.

A Correction

IN THE discussion following the paper "Removing Dockage from Wheat at the Thresher," by Robert H. Black, published in the February 1922 number of AGRICULTURAL ENGINEERING, two misquotations appear. The second sentence in the first paragraph on page 22 should read "The average dockage in the wheat marketed from the entire country this last year was slightly under two per cent. This may not seem like a large amount of dockage until you think of the large wheat crop which a country like ours produces." Also the first sentence of the third paragraph in the second column on the same page should read: "The ordinary fanning mills will not remove all of the wild oats because the wild oats are of such a shape and size that many of them will go through the sieves."

F. A. E. S. Activities

Chicago Meeting of Executive Board

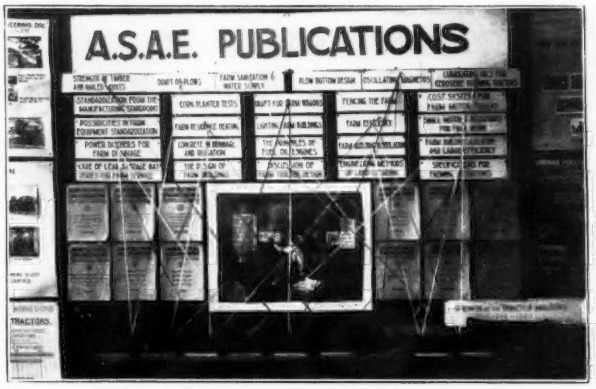
STEADY advancement of engineering ideals both here and abroad and a growing sense of the need and importance of professional unity were outstanding features of the meeting in Chicago on March 10 of the Executive Board of the American Engineering Council of the Federated American Engineering Societies. Reporting to the Board on the results of his recent trip through the South and Southwest, which began in St. Louis and ended in Louisville, President Mortimer E. Cooley stated that in every city visited by him he found engineers zealous to aid in expanding the influence of the Federation, the worth of which was coming to be so widely recognized that its growth and permanence were assured. The report of the executive secretary, L. W. Wallace, presented highly encouraging evidence of the favor with which the idea of engineering federation is being received in this and other countries.

A wide range of topics was considered by the Board, whose sessions, largely attended, were presided over by President Cooley and the first vice president, Calvert Townley, of New York. The Committee on Employment Service reported a resolution "that the maintenance of an employment bureau by the Council is not at this time advisable." After discussion, the Council voted to discharge the committee and instructed the president to appoint a committee of five to consider the whole question and report to the Board at its next meeting, which will be held at Pittsburgh in May on a day to be later decided upon.

The Executive Board received a long report from Rudolph P. Miller of New York, its representative on the National Board of Jurisdictional Awards, stating that the United Brotherhood of Carpenters and Joiners of America have not been observing the decisions of the Jurisdictional Board and that the attitude of the carpenters was causing serious embarrassment to owners, architects, engineers, contractors and workmen in the building industry as well as being detrimental to the public interest. As a consequence of this report, the Executive Board adopted a resolution urging "that the members of the American Institute of Architects and of the F. A. E. S. insert in all specifications and contracts for building operations a stipulation that the decisions of the Jurisdictional Board shall be observed."

It was further resolved "that this resolution shall be enforced as expeditiously as possible beginning with those localities in which the trouble appears to be the most acute and where action seems most urgent, and that all these signatories make special and united efforts toward securing general and complete compliance with all the decisions of the Jurisdictional Board."

The resolution also recited "that as and when trouble in any locality is brought to the attention of any of the signatories such organization shall take the initiative in forming



AMERICAN SOCIETY OF
Better Farm Homes - Efficient Farm Machinery
A S A E
American Society Agri. Engineers.
AGRICULTURAL ENGINEERS
Economical Farm Power - Productive Reclamation.
A.S.A.E. PUBLICATIONS

These two views are of the A. S. A. E. Exhibit at the Seventh National Tractor and Power Farming Show. The agricultural engineering divisions of the U. S. D. A. and ten state colleges contributed to it

a general committee of representatives from all the signatories for the purpose of dealing with the situation in that locality.

One of the liveliest discussions of the meeting of the Executive Board arose from a resolution presented by Philip N. Moore of St. Louis "that the president of the F. A. E. S. be authorized to offer the Secretary of War the service of a committee of disinterested distinguished, and skillful engineers, to be selected by a committee of its Executive Board, for the purpose of making a thorough investigation of the geological, engineering and manufacturing possibilities of the Muscle Shoals Power Project; this committee to serve without compensation, save for necessary expense." The resolution was voted down.

The Great Lakes-St. Lawrence Waterway project came before the Board, which decided that at present it was undesirable to take any action. This matter has been under consideration by the Public Affairs Committee of the Council for a considerable period, and the Board's decision was reached after opportunity had been provided for a careful study of the report of the International Joint Commission.

The Board tabled a resolution through the Boston Society of Civil Engineers to sanction an amendment to the House Bill creating the Roosevelt-Sequois National Park. The amendment provided that the entire area included within the park should be protected from the intrusion of water power development in the same manner that all existing national parks are protected.

The proposal to urge the elimination from the Fordney Bill of the tax on foreign books in English met with a divided report from the Committee on Public Affairs. Prof. Arthur M. Greene of Rensselaer Polytechnic Institute asserted that engineers should take a broad view of public questions and consider other interests quite as fairly as their own. Following a discussion, in which it was asserted that the proposed duty was a "tax on brains," the Board disposed of the controversy by tabling the resolution.

The general question of international engineering federation was considered in many phases and provoked a discussion in which the constitutionality of a proposal to admit the Engineering Institute of Canada to membership in the Federation, if formal application should be made, was the subject of a lengthy debate. Secretary Wallace reported that the proposal to form an international federation of engineers had been given wide consideration since the address at the January meeting of the Council of Dr. B. Stepanek, the Minister from Czecho-Slovakia. Federation progress was reported from England, Canada, Australia, Sweden, France and Italy. Dr. Stepanek has taken active interest in the international federation plan and has communicated with the members of the Council to ascertain their views. After a full expression of opinion, during which the idea was advanced that the Federation should include engineering organizations "of the American continent" instead of the United States alone, the Board adopted a proposal put forward by E. S. Carman of Cleveland for the appointment of a committee "to consider and report upon the affiliation of other engineering organizations than those within the United States with the F. A. E. S."

The Board adopted appropriate resolutions, presented by Col. A. S. Dwight of New York, on the death of Prof. J. W. Richards of Lehigh University and Col. F. A. Snyder. A resolution dealing with a national auxiliary language was tabled. President Cooley's report chronicled gratifying progress and an encouraging outlook. The treasurer's report showed an improved financial situation.

Secretary Wallace reported that the membership of the Associated Engineers of Spokane had so increased that the Association was now entitled to a representative on the Council, J. C. Ralston being the appointee. The Engineers Club of Columbus, Ohio, has appointed John R. Withrow as its representative upon the Council. The organizing work of the Federation was reported to be proceeding actively. In addition to Dean Cooley's tour addresses have been made by Secretary Wallace and other members of the Council, including Calvert Townley, Gardner S. Williams and L. P. Alford, before numerous engineering societies in the past three months. The extension of the work of the publicity director to the member societies was reported as a growing feature of this branch of the Federation's activities. A report from E. J. Prindle, chairman of the Patents Committee of the Council, commended the publicity efforts of the Federation as a powerful factor in bringing about the success of the movement to reform conditions in the United States Patent Office. The message of Patent Office Legislation was pointed out by engineers as an outstanding example of what can be accomplished by the Federation in the public interest. The work of Mr. Prindle was highly praised, and the pen with which President Harding signed the Patent Office Bill, now the prize possession of Mr. Prindle, was passed among the members of the Board as a symbol of effective engineering support of American science and invention.

Secretary Wallace reported numerous inquiries from engineering societies regarding the work of the Federation. The proposed international engineering congress in Philadelphia in 1926 was another matter discussed but no definite action was taken. Mr. Wallace made an exhaustive report on investigations by engineers and engineering groups of the Knickerbocker Theatre disaster in Washington. The Committee on Procedure recommended that the next meeting be held in Pittsburgh, the latter part of May, and the following meeting, in September or October, in Boston or New York.

The Committee on the Elimination of Waste in Industry advised the Board that there continues to be a very great interest on the part of the public in the Waste Report. Progress reports showed activity on the part of numerous committees. Increased participation in federal matters, through conferences and other close personal contacts with departments and bureaus of Washington, was reported.

Wanted—Correct Addresses of These A. S. A. E. Members

NOTE: Mail is being returned from the addresses given below. These members, or others who know of their whereabouts, are requested to send the Secretary their correct addresses at once. Inasmuch as delivery cannot now be made, AGRICULTURAL ENGINEERING will not be mailed until correct addresses are received.

George J. Baker, 112 Theodore Street, Detroit, Michigan.

Claude S. Bristow, Elks Club, Portland, Oregon.

Joaquim Bertino de Moraes Carvalho, Directoria Geral da Industria Pastoril, Rua Matta Machado, Rio de Janeiro, Brazil.

George Collins, 461 Market Street, San Francisco, California.

D. M. Emery, Illinois Hotel, Bloomington, Illinois.

F. K. Flynn, 1 Main Street, Watertown, Wisconsin.

K. D. Hequembourg, 531 W. 112th St., New York City.

W. C. Kreuger, North Carolina Agricultural College, Raleigh, North Carolina.

A. M. Leoni, 3832 Reisterstown Road, Baltimore, Maryland.

J. T. Montgomery, Alva, Oklahoma.

Arthur H. Pearsoll, 1350 Rosedale Avenue, Chicago, Illinois.

John Howard Rees, 2211 Commerce Building, Columbus, Ohio.

S. Y. Sweeney, 111 East Campbell Avenue, Roanoke, Virginia.

T. A. Toenjes, 1115 South Street, Waterloo, Iowa.

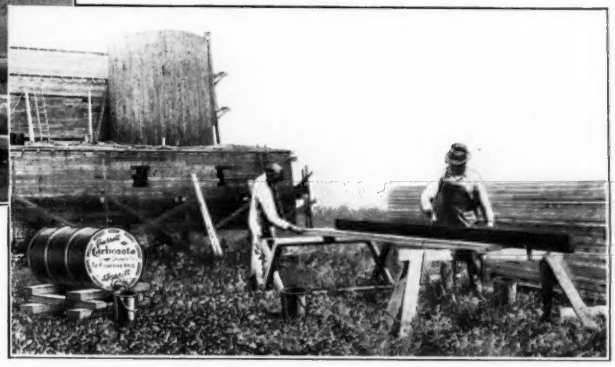
George G. Whitfield, Demopolis, Alabama.

R. S. Whiting, 908 Galt Avenue, Chicago, Illinois.

J. C. Weidrich, c/o Dempsey Hotel, Davenport, Iowa.

Left: (Open Tank process) Carbosoting Posts grown on farm woodlot.

Below: (Surface treatment) Applying two brush coats of Carbosota.



Economic Possibilities of Wood Preservation on the Farm—

Elimination of decay in the structural wood employed on American farms, exclusive of fence posts, would result in an annual saving equal to the interest on approximately *six billions of dollars.* Theoretically, this vast sum could thus be made available to the agricultural industry for additions and betterments.

This illustration is used merely to emphasize the economic value of wood preservation to the farmer. It is, of course, unreasonable to hope for 100% practice of this economy; at least not for many years to come. But even a small beginning is more than worth while.

In furthering this economic and conservation movement, the State Agricultural Colleges, their Extension Departments, and County Agricultural Agents have unusual opportunities for service. For who else is so well able to give farmers the much needed authoritative information and practical advice?

The wide distribution of Carbosota has placed the economy of wood preservation within reach of every farmer, wherever located. Carbosota is a pure, liquid grade of coal-tar cresote oil specially refined and processed for employment in non-pressure treatments.

We will gladly co-operate in bringing about a better understanding of the practical application of wood preservation to farm conditions. The service of our engineers is free and may be secured by addressing our nearest office.

The Barrett Company

New York	Chicago	Philadelphia	Boston	St. Louis	Cleveland
Cincinnati	Pittsburgh	Detroit	New Orleans	Birmingham	Kansas City
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Elizabeth	Buffalo	Baltimore	Omaha	Houston	Denver
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Barrett Carbosota For Preserving Wood

New Members of the Society

MEMBERS

Charles C. Crockatt, Chief Engineer, Hollow Building Tile Association, Conway Building, Chicago, Illinois.

Henry Raymond Herndon, Farm Specialist, Portland Cement Association, Dallas, Texas.

Theodore Frederick Laist, Chicago Representative of National Lumber Manufacturers Association, 1613 Harris Trust Building, Chicago, Illinois.

Walter Wallace Weir, Assistant Professor of Soil Technology, 320 Hilgard Hall, University of California, Berkeley, California.

TRANSFER OF MEMBERSHIP GRADE

Floyd E. Agler, 23 West Tenth Avenue, Columbus, Ohio (Student Branch Member to Junior Member)

Ralph L. Patty, Extension Specialist, South Dakota State College, Brookings, South Dakota. (Associate Member to Member)

Harold P. Twitchell, Extension Specialist in Agricultural Engineering, Ohio State University, Columbus, Ohio. (Student Branch Member to Junior Member)

Charles Earl Walsh, Assistant in Agricultural Engineering, University of California, University Farm, Davis, California. (Student Branch Member to Associate Member)

Archie Andrew Wolf, Assistant in Agricultural Engineering, University of Wisconsin, Madison, Wisconsin. (Student Branch Member to Junior Member)

Applicants for Membership

The following is a list of applicants for membership received since the publication of the February issue of AGRICULTURAL ENGINEERING. Members of the Society are urged to send pertinent information relative to the applicants for the consideration of the Council prior to their election.

George Edwin Oliver, Drainage Engineer for Monona County, Onawa, Iowa.

Francis G. Shaw, Engineer, International Harvester Company of France, 155 Avenue du General Michel Bizot, Paris XII, France.

Claude O. Streeter, Mechanical Engineer, The Graton & Knight Manufacturing Company, Worcester, Massachusetts.

Employment Service

This service, conducted by the American Society of Agricultural Engineers, appears regularly in each issue of AGRICULTURAL ENGINEERING. Members of the Society in good standing will be listed in the published notices of the "Men Available" section. Non-members, as well as members, are privileged to use the "Positions Available" section. Copy for notices should be in the Secretary's hands by the 20th of the month preceding date of issue. The form of notice should be such that the initial words indicate the classification. No charge will be made for this service.

The Secretary receives several times each month from The Federated American Engineering Societies a bulletin listing the "positions open" which are reported to the F.A.E.S. Employment Service by member engineering societies. Copies of this bulletin are sent to the "men available" listed below, or other members seeking employment, as soon as received.

Men Available

AGRICULTURAL ENGINEER wants position as experimental agricultural engineer or with some agricultural publication. Graduate, 1918, agricultural college of the University of Illinois. Was editor of the Illinois agricultural students publication in his senior year. For two years employed by an explosives manufacturer as agricultural sales and service man for the State of Wisconsin. At present associated with the land clearing department of the University of Wisconsin. Age 25, married, American. MA-101

AGRICULTURAL AND CHEMICAL ENGINEER, with several years experience in research and experimental work, both in agricultural and chemical lines, desires a position on an agricultural experiment station staff or in some phases of agricultural engineering work. MA-102.

AGRICULTURAL ENGINEER, with M.E. degree and three and a half years experience in charge of the experimental department of one of the large tractor manufacturers doing experimental and development work on tractors; gasoline, kerosene, and alcohol engines; carburetors; magnetos; hot spot manifolds, and lubricating oils, desires employment with someone developing a tractor for general farm work. MA-103

MECHANICAL AND ELECTRICAL ENGINEER, graduate of Cornell University and Armour Institute, with nineteen years of practical experience in designing, manufacturing, and marketing gasoline engines, automobiles, motor trucks and tractors, having specialized particularly on internal-combustion motors and their application, prefers mechanical work cooperating with the different manufacturing and sales departments along the lines of sales engineering, or other work into which his qualifications would fit. MA-104

AGRICULTURAL GRADUATE (1916) from the Mississippi A. & M. College with the degree of B.S.A., formerly connected with the U. S. Department of Agriculture, in military service September, 1917 to June, 1919, and more recently a cotton planter, wants a position as instructor in some branch of agriculture. MA-105

AGRICULTURAL ENGINEER wants position in southwest. Graduate of University of Illinois 1915, five years practical experience on Illinois farm with power equipment, two years in charge of the agricultural engineering department New Mexico College of Agriculture; considerable garage experience and service experience on unit power and light plants. Also one summer in Philadelphia battery service station. MA-106

AGRICULTURAL ENGINEER, graduate from the agricultural engineering course of the Iowa State College, who has had a great deal of experience in sewer work and farm building construction in the southern states, is interested in securing employment with a firm specializing on farm structures or farm sanitation. MA-107

AGRICULTURAL ENGINEER, graduate in agriculture at Cornell and trained in mechanical and electrical engineering, at present assistant professor of rural engineering at an agricultural college, wants position in the same or related field. Six years teaching experience and about six years engineering experience with telephones, milking machines, field machinery, concrete pipe making machinery and gas engines. Thoroughly trained in automotive theory and practice, including repair. MA-108

AGRICULTURAL ENGINEER wants position on a farm or with some firm where an engineering and general agricultural training is required. Will graduate from the agricultural college of the Ohio State University in June 1922. Major work done in agricultural engineering and farm management. Born and raised on farm. Age 22. Unmarried. MA-109.

Positions Available

INSTRUCTOR IN POWER FARMING. The department of agricultural engineering of the Virginia Polytechnic Institute, Blacksburg, Virginia, wants a man qualified to teach farm implements, motors, motor vehicles, and rural sanitary equipment. Applicants should write direct to Charles E. Seitz, head of the department. PA-1

POWER FARMING

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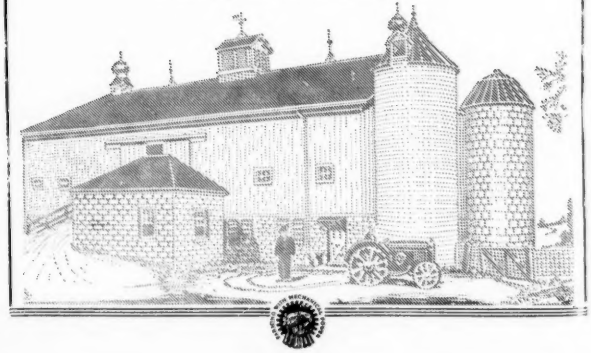
This institution originated the term "power farming" as applied to farming with mechanical power.